Patent Claims

1. Articulated yoke (4) for use in universal-joint propeller shafts;

1.1 having at least one leg member for coupling to a machine element on the drive side or take-off side;

1.2 having at least one bearing part (8), surrounding a bore (9), which forms a supporting surface for supporting at least one partial region of a roller-bearing arrangement (11) for the positioning of a journal (6) of a differential-pinion shaft (3) in the articulated yoke (4);

characterized by the following feature:

1.3 the supporting surface (10) has a local recess at least in the region of the rolling elements (14) of the roller-bearing arrangement (11) that are most highly stressed in the mounted state during torque transmission.

2. The articulated yoke as claimed in claim 1, wherein the position and/or the profile, or the shape and/or the size, of the recess are determined as a function of at least one parameter directly characterizing the load situation.

3. The articulated yoke as claimed in claim 2, wherein at least one of the parameters listed below is used as a parameter for characterizing the load situation:

- the size of the force to be transmitted and/or

- the geometry of the connecting parts of the roller-bearing arrangement and/or
- the distortion of the connecting elements of the roller-bearing arrangement and/or
- the bearing play.

4. The articulated yoke as claimed in one of claims 1 to 3, wherein the recess (20), observed in the position of installation, is disposed in the surface regions (19) of the supporting surface (10) pointing in the circumferential direction.

5. The articulated yoke as claimed in one of claims 1 to 4, wherein the recess (20) extends in the position of installation parallel to the journal axis (Z1) of the journal (6) mounted in the bore (9) toward the pivot axis (G) over the entire extent of the bore (9).

6. The articulated yoke as claimed in one of claims 1 to 5, wherein the profile of the recess (20) in the supporting surface (10) undergoes a change over the direction of extension of the recess (20) in the direction parallel to the journal axis (Z1) of the journal (6), mounted in the articulated yoke (4) of a journal arrangement (5) toward the pivot axis (G).

7. The articulated yoke as claimed in claim 6, wherein the change of profile of the recess (20) undergoes a reduction in the direction parallel to the journal axis (Z1) of the journal (6) mounted in the articulated yoke (4), of the differential-pinion shaft (3) with regard to its width in

the circumferential direction of the bore (9) and its extent in the direction of the extension of the bore (9) toward the pivot axis (G).

8. The articulated yoke as claimed in one of claims 1 to 7, wherein the recesses (20) are arranged symmetrically relative to a plane (E) which is described by the journal axis of the journal (6), mounted in the articulated yoke, of a differential-pinion shaft (3) and the pivot axis (G).

9. The articulated yoke as claimed in one of claims 1 to 8, wherein the supporting surface (10) and/or the surface of the supporting surface (10) that can be described by the recess (20) are surface-treated.

10. The articulated yoke as claimed in claim 9, wherein the supporting surface (10) and/or the recess (20) are provided with a perforation.

11. The articulated yoke as claimed in claim 10, wherein the recess (20) is treated by percussion compression.

12. The articulated yoke as claimed in one of claims 1 to 11, wherein the latter comprises at least two yoke halves (4.1), each yoke half (4.1) having a leg member and a bearing part.

13. The articulated yoke as claimed in one of claims 1 to 12, wherein the bore (9) is designed as a blind hole.

14. A method for the production of a supporting surface (10) for the achievement of a uniform load distribution of rolling elements of a roller-bearing arrangement for the mounting of journals (6) of a differential-pinion shaft (3)

~~in an articulated yoke (4) having a local recess (20), as~~ claimed in one of claims 1 to 13, ~~wherein, relative to the~~ machining of the bore ~~(9) in~~ the articulated yoke (4), the tool spindle used is guided, with respect to its guide axis A, ~~in~~ an inclined manner relative to the theoretical median ~~axis A_L of a cylindrical bore.~~

15. The method as claimed in claim 14, wherein the position of the recesses (20) and their dimensions are in each case determined by the extent of the angle of inclination between the guide axis of the tool spindle (24) and the theoretical median axis A_L of the bore (9) and the direction of inclination.

16. A bearing arrangement for the positioning of differential-pinion shafts in an articulated yoke (4) for use in universal-joint propeller shafts;

16.1 having a radial bearing disposed in a bore in the bearing part of the articulated yoke and comprising a plurality of rolling elements, a first element forming an outer running surface and a second element forming an inner running surface;

16.2 the outer running surface forms a first supporting surface and the inner running surface a second supporting surface for the rolling elements;

characterized by the following features:

16.2 the first supporting surface has a local recess at least in the region of the rolling elements of the radial bearing that are most highly stressed in the mounted state during torque transmission.

17. The bearing arrangement as claimed in claim 16, wherein the position and/or the profile, or the shape and/or the size, of the recess are determined as a function of at least one parameter directly characterizing the load situation.

18. The bearing arrangement as claimed in claim 16, wherein at least one of the parameters listed below is used as a parameter for characterizing the load situation:

- the size of the force to be transmitted and/or
- the geometry of the connecting parts of the roller-bearing arrangement and/or
- the distortion of the connecting elements of the roller-bearing arrangement and/or
- the bearing play.

19. ~~The bearing arrangement as claimed in one of claims~~ 16 to 18, wherein the recess, observed in the position of installation, is disposed in the surface regions of the supporting surface pointing in the circumferential direction.

20. The bearing arrangement as claimed in one of claims 16 to ~~19~~, wherein the recess extends in the position of ~~installation parallel to the journal axis of the journal~~

mounted in the bore toward the pivot axis over the entire extent of the bore.

21. The bearing arrangement as claimed in one of claims 16 to 20, wherein the profile of the recess in the supporting surface undergoes a change over the direction of extension of the recess in the direction parallel to the journal axis of the journal, mounted in the articulated yoke of a journal arrangement toward the pivot axis.

22. The bearing arrangement as claimed in claim 21, wherein the change of profile of the recess undergoes a reduction in the direction parallel to the journal axis (Z1) of the journal mounted in the articulated yoke, of the differential-pinion shaft with regard to its width in the circumferential direction of the bore and its extent in the direction of the extension of the bore toward the pivot axis.

23. The bearing arrangement as claimed in one of claims 16 to 22, wherein the recesses are arranged symmetrically relative to a plane (E) which is described by the journal axis of the journal, mounted in the articulated yoke, of a differential-pinion shaft and the pivot axis (G).

24. The bearing arrangement as claimed in one of claims 16 to 24, wherein the supporting surface (10) and/or the surface of the supporting surface (10) that can be described by the recess (20) are surface-treated.

List of references

1 Universal bearing arrangement

2 Journal bearing

3 Differential-pinion shaft

4 Articulated yoke

4.1 Yoke half

5 Journal arrangement

6 Journal

7 Leg member

8 Bearing part

9 Bore

10 Supporting surface

11 Roller-bearing arrangement

12 Radial bearing

13 Outer ring

14 Rolling elements

15 Inner ring

16 First inner running surface

17 Second outer running surface

18 Outer surface of the yoke half

19 Surface region

20 Recess

21 Profile

22 Inner surface of the yoke half

24 Tool spindle

Z1 Journal axis of the journal mounted in the yoke half

G Pivot axis

F_u Circumferential force

A Axis of the tool spindle

α Angle of inclination of the bending line of the journal

β_B Oblique position of the bearing

γ Total angle of twist

E Angle between median axis of the bore and axis of symmetry of the tool spindle

f_B Displacement of the bore

f_G Total displacement travel